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Sustainability assessment of the in solution allylation versus ball-milling allylation of lignin-derived phenolic synthons

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PURPOSE OF THE ABSTRACT

Solvents, often volatile and toxic, are major contributors to the production of waste in the synthesis of high-added value molecules. As an answer to this problematic situation, mechanochemistry is an opportunity to make chemistry using no or little solvent, by milling, grinding, or other mechanical action. In this context, allylation of phenols, a widely used reaction in multistep synthetic pathways, was investigated using mechanochemistry, specifically using planetary ball milling. This synthesis was first optimized on lignin-derived vanillin by varying key parameters including both chemical (e.g., stoichiometry, reaction time) and mechanical (e.g., rotation speed, material, size and number of beads) conditions. The optimized procedure was then successfully implemented to ethyl ferulate, another biobased monophenol, as well as validated at the multigram scale. Efficiency and environmental impact of this original approach by mechanochemistry was compared with more conventional solution-based conditions. The results of this comparison will be presented during this communication.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

mecanochemistry | solvent free | planetary movement | ball grinding

BIBLIOGRAPHY